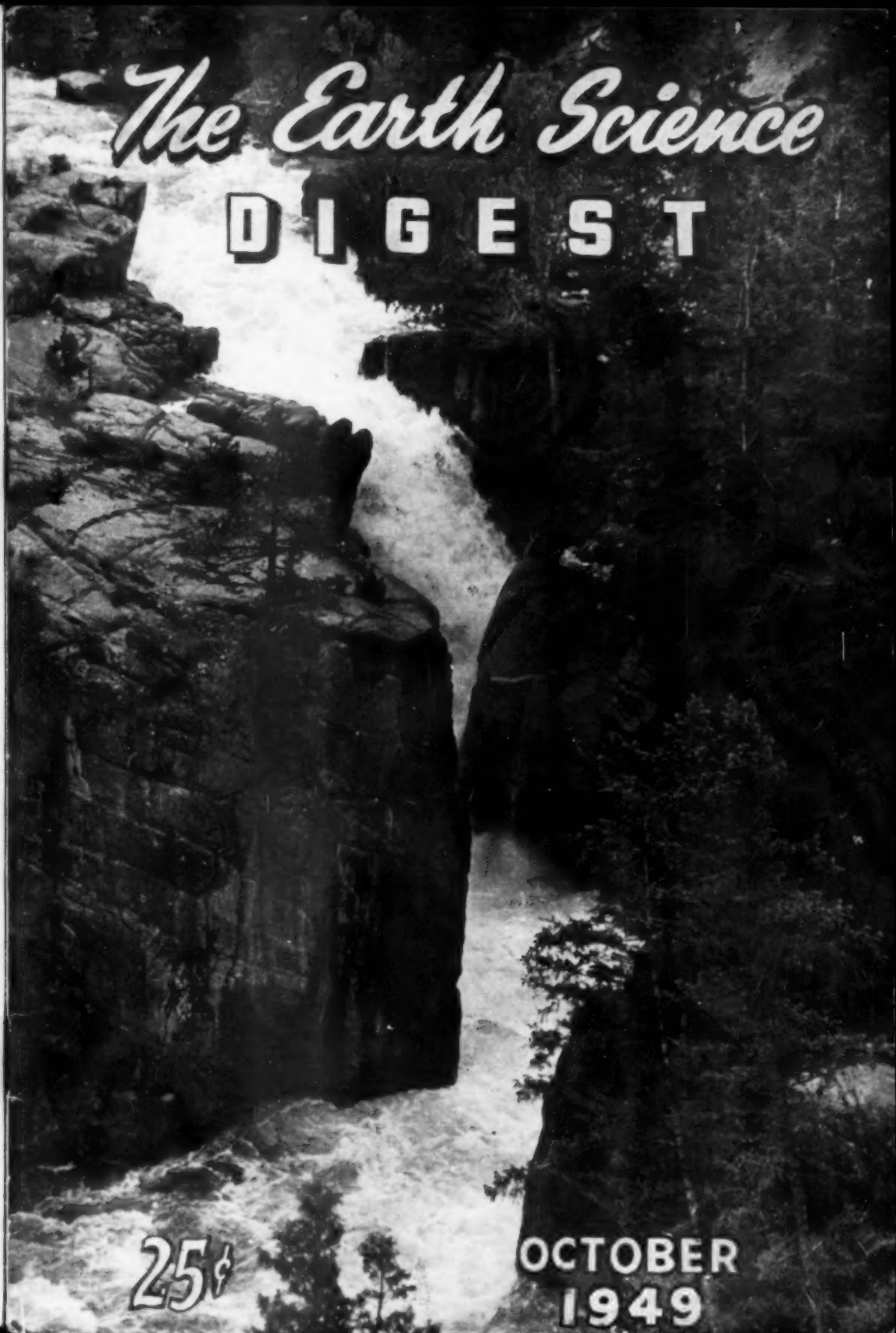
The Earth Science DIGEST



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1949

The Earth Science Digest

Revere, Massachusetts

Vol. IV OCTOBER, 1949 No. 3

A magazine devoted to the geological sciences.

THE EARTH SCIENCE DIGEST is open to articles of geologic interest. Manuscripts, photographs and sketches will be returned if accompanied by ample first-class postage.

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S. ALBERT EISENBERG, Publisher
GERTRUDE ROBERTS, Business Manager

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Meetings and Conventions

Geological Society of America, 62nd Annual Meeting; Paleontological Society, 41st Annual Meeting; Mineralogical Society of America, 30th Annual Meeting; Society of Vertebrate Paleontology, 9th Annual Meeting. Nov. 10-12, 1949, Cortez Hotel, El Paso, Texas.

American Association for the Advancement of Science, Section E, 116th Annual Meeting. Dec. 29-30, 1949. Hotel Statler, New York.

American Association of Petroleum Geologists, 34th Annual Meeting; Society of Economic Paleontologists and Mineralogists, 23rd Annual Meeting; Society of Exploration Geophysicists, 19th Annual Meeting. April 23-28, 1949, Chicago.

Spinning May Cause Earth's Magnetic Field

CALVIN N. MOOERS
Science Service Correspondent

MINNEAPOLIS, Minn., Sept. 22—The gravity pull of the earth as it spins on its axis may be what gives the earth its magnetic field and makes compasses point to the north.

This simple explanation for one of the baffling and important probelms of modern science is given by Dr. Antonio Giao of Lisbon, Portugal, in the scientific journal, *Physical Review*.

The new explanation of the earth's magnetism is based on Dr. Giao's "unified field theory." Scientists following this explanation do not need to assume that the core of the earth is a giant magnet or that the ionosphere and atmosphere have impossibly great circulating electric currents.

Beginning with a study of the natural geometry of our familiar three- dimensional space plus time, and by wrapping another fifth dimensional space around it, Dr. Giao finds that the gravitational effects explained by Einstein have a close parallel in the electrical effects of the new geometry and that the two are necessarily closely related.

Behind the complexities of Dr. Giao's mathematics is the fact that the familiar effects of gravity are due to the curvatures of our space-time as seen from within our universe. But electric and magnetic effects come from curvatures that can only be appreciated by a mathematician or by some five-dimensional being looking at us from outside of our universe.

The magnetic fields of the earth, sun, stars and the neutron all receive a direct explanation by the new theory. In the case of the earth, assumed to be a rotating mass containing no permanent magnets, the magnetic field that points compasses to the north appears as a natural consequence of the rotation. In addition, there appears at the same time an apparent electric charge on the earth.

In the case of some massive rotating stars, Dr. Giao surmises, this electric charge of the star might become great enough to make the star into a giant particle accelerator or "atom smasher" which can throw atomic fragments out into space with the great energies of cosmic rays.

Those stars with the peculiar variable magnetic fields recently observed are explained by the theory, as well as the more familiar Coulomb electrical forces well-known to physics students.

Milwaukee Convention To Be Held June 28-30, 1950

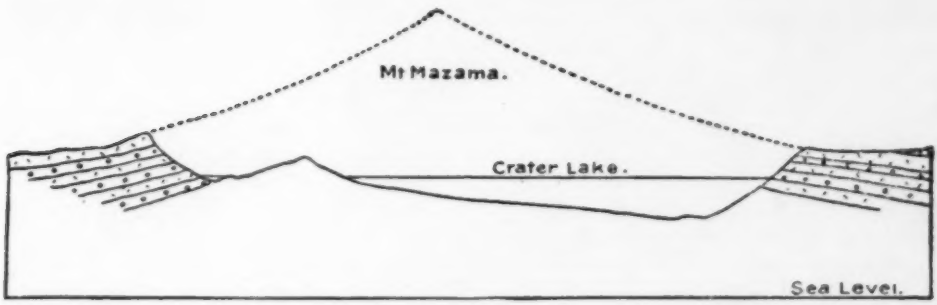
The Wisconsin Geological Society will serve as host to the Midwest Federation of Geological Societies and the American Federation of Mineralogical Societies at Milwaukee, Wisconsin, June 28-30, 1950. This will be the 10th Annual Convention of the Midwest Federation and the 3rd National Convention of the American Federation. Mr. James O. Montague, 1026 East Pleasant Street, Milwaukee, was appointed General Chairman of the Convention.

Cover Photo

Shell Creek, now cutting a deep gorge into the granite core of the Big Horn Mountains of Wyoming, offers a splendid illustration of the erosive power of a mountain stream. This is a view, by H. P. Zuidema, of the creek in Granite Gorge, above Shell, on the west flank of the Big Horns.

MOUNT MAZAMA AND CRATER LAKE

JEROME M. EISENBERG



National Park Service

Crater Lake, Oregon. A restoration of the inferred former cone, Mount Mazama

Crater Lake has the distinction of being the deepest lake on the North American continent and the fifth deepest lake in the world. To this scenic wonderland, however, is attributed a much more fascinating story, for it lies in the heart of an extinct volcano, Mount Mazama.

MOUNT MAZAMA

Mount Mazama was a commanding peak of the Cascade Range in southern Oregon. It was a member of the north-south belt of the Range, the High Cascades, composed of Pliocene and younger volcanic cones, to which belonged such peaks as Mount Adam, McLoughlin, Rainier, and Shasta.

A shallow sea covered this area during the late Cretaceous period, about 100 million years ago. The sea retreated due to the uplift of the land during the Eocene period, about 50 million years ago. This area now underwent volcanic activity and intrusions of igneous rocks, creating a vast basaltic plateau. Huge volcanoes formed in a north-south belt on the plateau during the Pleistocene and Recent times, forming the Cascade Range.

Mount Mazama reached a probable height of 12,000 feet, rising from an elevation of from 5000 to 6000 feet above sea level. Like the other peaks, it was formed mainly by the effusion of hypersthene-andesite. Several successive lava flows and accumulated volcanic ash formed the peak, which is, in fact, not a single cone, but a composite group of overlapping cones.

GLACIATION

Glaciation now took its course, and the cone was modified by stream and glacial action. U-shaped valleys such as Kerr Notch, Munson Valley, and Sun Notch, were formed by the glaciers, which continually advanced and retreated. A sheet of ice covered the entire mountain, except for a few projecting crests. This ice in some places reached a thickness of over 1000 feet.

Other evidence of this glaciation

U. S. Dept. of the Interior

Crater Lake National Park, Oregon. Mount Shasta can be seen in the distance. This high altitude picture was taken with red filters.

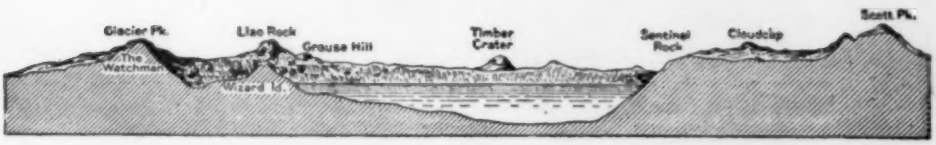
is clearly shown by glacial moraines, which underlie even the oldest lavas; boulder tills and fluvioglacial sand which are interbedded with the volcanics; and glacial polish. Lloa Rock was formed by the filling of a glacial notch by a lava flow.

THE ERUPTION OF MOUNT MAZAMA

Following the retreat of the ice, a semicircular arc of volcanic vents formed on the northern flank of the volcano, from which viscous lava flowed. In the summit region small explosions brought forth pumice.

Following these minor disturbances was a long period of quiescence. Finally, about 5000 years ago, eruptions began. At first fine volcanic ash was blown out of the crater in mild eruptions, soon increasing in the size of the pumice and the violence of the explosions. Over 5000 square miles of land were covered by more than 6 inches of pumice. As far as 70 miles distant from Crater Lake, the pumice forms a sheet a foot thick. Some valleys were filled with pumice to a depth of 300 feet. No doubt the finer dust encircled the world similar to the Krakatoa eruptions in 1883.

Soon the pumice rushed down the sides of the mountain in flowing avalanches. These traveled as far as 35 miles. Bombs of pumice 14



National Park Service

A PRESENT CROSS-SECTION OF CRATER LAKE

feet in diameter were found in the flows twenty miles from the crater. The glacial canyons were changed into broad plains covered with smoking fumeroles. A few weak explosions following the discharging of the major flows, brought to a climax this spectacular event.

The volume of ejecta laid down by these pumice falls and flows is enormous, amounting to about 11.75 cubic miles. About 3.5 cubic miles was accounted for by the pumice fall, and about 8 cubic miles from the glowing avalanches. The final volcanic ash fall ejected in the dying explosions totals only about a quarter of a cubic mile.

FORMATION OF THE CALDERA

It was the loss of support beneath the summit of the volcano due to the void caused by the rapid withdrawal of the pumice and lava that led to the engulfment of the volcanic cone. This collapse and subsidence of the cone formed the volcanic basin, or *caldera*, in which Crater Lake is now situated. The formation of the caldera most probably took place either during or immediately after the eruptions.

It has been estimated that 17 cubic miles of the cone disappeared to form the caldera. However, we have accounted for only about 11.75 cubic miles of ejecta. About 7.5 cubic miles of this ejecta was vesicular, and if remelted to a bubble-free liquid its volume would be cut in half. This reduced volume woud be at most about 3 cubic miles, making the total volume of ejecta about 6.5 cubic miles. This is only a little more than one third the volume of the engulfed cone. Geologists are still seeking for a satisfactory explanation of all the events leading to the origin of the caldera.

THEORIES OF ORIGIN

In his Collapse Theory, D. S. Diller[1] proposes that the caldera was formed entirely by engulfment. He was convinced that the destruction of the volcanic cone followed long after the explosions. Gradual, piecemeal foundering from the center outward accounted for the absence of arch-shaped fault blocks, which he sought in vain.

W. D. Smith and C. R. Swartzlow[2] advanced the theory that the volcanic peak was decapitated by violent explosions. Internal blasts resulted in the removal of 17 cubic miles of the original volcanic cone. They believed that Diller had understimated the amount of debris to be found in the vicinity of the caldera. They thought that the pumice mantle covered huge quantities of coarse volcanic blocks. However, recent studies show that only about 1½ cubic miles of rock fragments were taken from the peak of the volcano. The remainder was new magma, derived from the underlying reservoir inside the volcano.

Howell Williams[3] has advanced the theory that during the eruption 5 cubic miles of pumice and scoria, when recalculated as bubble-free liquid and crystals, was drained

Oregon State Highway Commission

Phantom Ship, Crater Lake National Park. This is thought to be a volcanic cone, from which the oldest of the visible lavas issued.

from the underlying magma chambers. In addition, 1.5 cubic miles of old rock was torn from the peak. He accounts for the remaining 10.5 cubic miles by the engulfment of the peak through the withdrawal of magmatic support from below. The principal cause for this withdrawal is due not to the rapid eruption of the magma from the upper part of the magma chamber, but to the injection of the magma in fissures at greater depths.

The semicircular arc of volcanic vents formed on the northern flank of the cone predetermined the eccentric collapse of the cone with respect to the former summit. The cooling and solidification of the magma remaining in the volcano probably brought about a subsidence of the floor of the caldera.

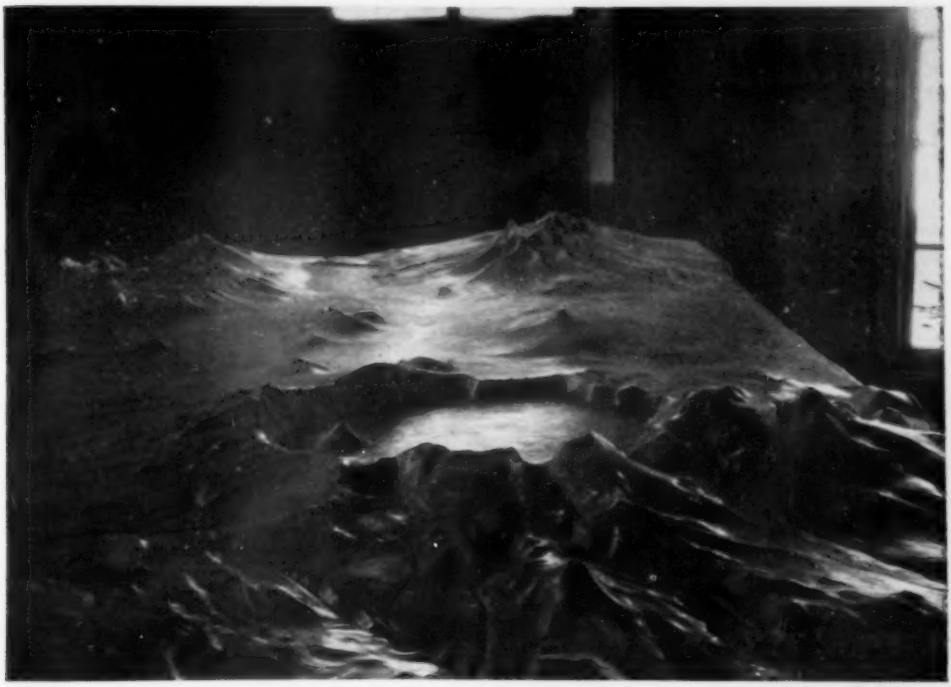
Another shorter period of quiescence followed, but soon activity began again. About 1000 years ago, a sheet of lava erupted from a volcanic cone, Wizard Island, which rose close to the edge of the caldera. The flatness of the caldera floor is probably due to molten lava issuing from a fissure.

CRATER LAKE

Crater Lake probably began to form immediately after the formation of the caldera. The water,

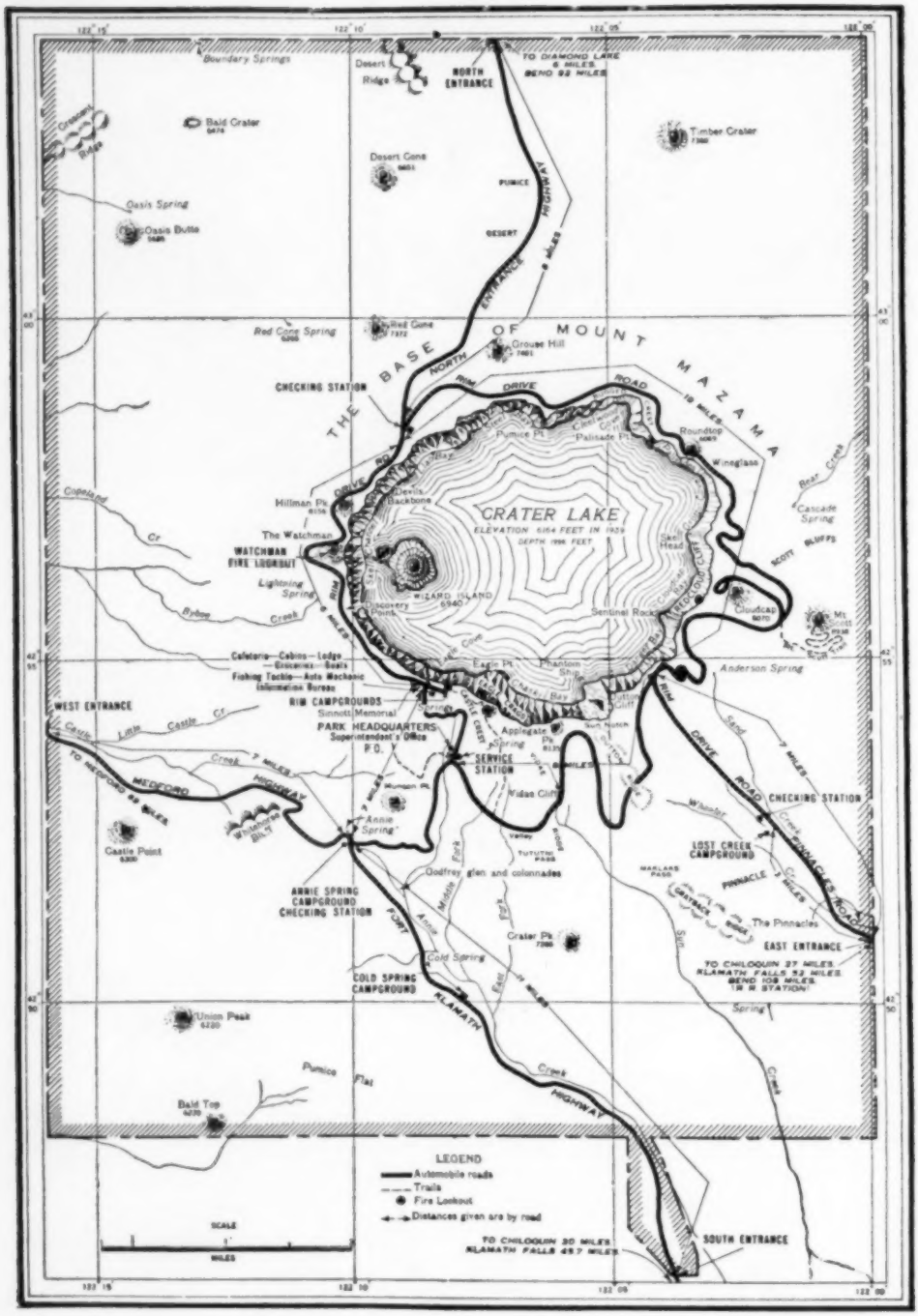
George A Grant (Courtesy of National Park Service)

Wizard Island and Lloa Rock, Crater Lake National Park. Llao Rock is a cliff formed by a lava flow whose vent is part of the northern arc of vents at the northern flank of the volcano.



U. S. Dept. of the Interior

Relief map of Crater Lake and the surrounding area in the Information Office of the Crater Lake National Park.



National Park Service

MAP OF CRATER LAKE NATIONAL PARK, OREGON

George A. Grant
[Courtesy of National Park Service]

View up Sand Creek Canyon, Crater Lake National Park, showing the Pinnacles on the south side. They show the difference in erosion between the north and south sides, the north side getting more exposure to the sun and sustaining more vegetation, thus protecting the slope from rapid erosion. The Pinnacles are composed of volcanic breccia.

which is unusually pure, is derived from rainfall and snowfall, and from the discharge of streams and springs from the crater walls. Evaporation, percolation, precipitation, and inflow are in a near state of balance, maintaining an approximately constant water level. The lake now has a depth of 1996 feet and a surface elevation of 6164 feet about sea level (1939).

The fact that the early American Indian witnessed the formation of Crater Lake, if only from a distance, is shown by the discovery of Indian artifacts beneath the deposits of pumice from the volcano. The actual bones of man, or even of animals, have not as yet been unearthed.

White men did not see the lake until June 12, 1853, when it was discovered by John W. Hillman, leading a party of prospectors in search of the "Lost Cabin Mine". In 1869 it was named Crater Lake, and was made a National Park in 1902 by an act of Congress.

REFERENCES:

[1] J. S. Diller, "The Geology and Petrography of Crater Lake National Park," U. S. Geological Survey Professional Paper 3, 1902.

[2] W. D. Smith and C. R. Swartzlow, "Mount Mazama: Explosion Versus Collapse," Bulletin of the Geological Society of America, Vol. 47, No. 12 (December 1936), pp. 1809-1830.

[3] Howell Williams, "The Geology of Crater Lake National Park With a Reconnaissance of the Cascade Range Southward to Mount Shasta," Carnegie Institution of Washington Publication 540, 1942.

Yuma and Folsom Stone Agers Were Probably Contemporaries

NEW YORK, Sept. 7 (Science Service) — Evidence that the two main groups of Stone Age "Americans" were contemporaries about 10,000 years ago was presented to the Twenty-ninth International Congress of Americanists here by Dr. John Hall Moss, Franklin and Marshall College geologist.

Dr. Moss this summer studied the geological formations at the Finmey Yuma site at Eden, Wyo., where Yuma points had been discovered. The Yuma points have been considered generally earlier than Folsom points, but Dr. Moss' findings indicated that Yuma man had been in southwestern Wyoming right up to only about 10,000 years ago. This puts him well into the period of Folsom man.

Yuma man apparently began earlier than Folsom, but the new evidence indicates that he continued throughout the period of Folsom man.

Aerial Photographs To Analyze Fukui Earthquake

Entirely new aerial photographic techniques for analyzing earthquake damage are described in a geological report recently issued by Far East Command Headquarters, concerning the Fukui earthquake of June, 1948 in the Japanese island of Honshu. Immediately following the quake, low-flying reconnaisance planes blanketed the affected region with aerial photographs which aided geologists and rescue workers who entered the area the following day.

The aerial photographs were used to determine the amount of damage to man-made structures, as well as to evaluate geological changes in the area. Although aerial photos have been used extensively by geologists in recent years to locate oil fields and to study terrain, this is the first recorded instance of their use in connection with modern earthquake studies.

Determined by geological observors to be the third most violent Japanese earthquake within historic times, the Fukui quake was the second major seismic disaster in the four years since U. S. troops occupied Japan. The violent earth shocks affected only about 200 square miles in western Honshu, but within this small area 75% of the houses were destroyed, roads and railroads were badly damaged, and levees along rivers were shattered. Approximately 5,000 people were killed by collapse of buildings and from fires started by overturned stoves and charcoal braziers. As in the case of the San Francisco quake of 1906, most destructive in U. S. history, structures built on soft ground or mud flats suffered the most damage.

Investigation of the earthquake area was undertaken at the request of the military authorities to secure information which might prevent future loss of life and property. The resulting geological report was prepared by geologists from the U. S. Geological Survey with the aide of personnel of the Far East Command and Japanese seismologists.

Japanese scientists have organized a thorough investigation of the earthquake area with the approval of occupation authorities. The report of this work is expected to throw light on practical means of constructing safer houses in earthquake areas of Japan.

Like Ecuador, which recently suffered one of the most costly earthquakes in human history, Japan lies in the earthquake belt which girdles the Pacific Ocean. Although only one in several hundred is highly destructive, about 400 earthquakes per year occur in the Japanese islands. For this reason, Japan has for many years been one of the world's major centers of earthquake research.

Water Resources In September

The drought area in the Northeast diminished slightly in areal extent during September. In general stream flow increased somewhat, but ground-water levels remained low in most areas.

Steamflow continued well above normal throughout the region extending from Virginia to Florida, mostly owing to carryover from the high water resulting from the hurricane of late August.

Streamflow was generally well below normal in the North Central States. Water supplies in the West averaged somewhat below normal. The flow of the Columbia and Colorado Rivers was substantially below normal.

— *Water Resources Review*

Earth Science Abstracts

[Selected articles on the earth sciences, appearing in current scientific publications, are abstracted here for the convenience of our readers.]

Physical Geology

CARLSBAD CAVERNS AND OTHER CAVES OF THE GUADALUPE BLOCK, NEW MEXICO. J. Harlen Bretz. **Jour. Geology,** Vol. 57, No. 5 (Sept. 1949), pp. 447-463. The limestone caverns in this area antedate the present erosion cycle and probably the deposition of the Pliocene Ogallala formation. They were made under completely saturated conditions.

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GEOLOGY OF THE MONADNOCK REGION OF NEW HAMPSHIRE. Katherine Fowler-Billings. **Geol. Soc. America Bull.,** Vol. 60, No. 8 (Aug. 1949), pp. 1249-1280. Rising 2000 feet above the New England Upland in southwestern New Hampshire, Mt. Monadnock is the dominant physiographic feature of the area. It is the type example of the term "monadnock". The region is underlain by Ordovisian (?) to late Devonian (?) metamorphic and plutonic rocks. It was folded in the middle or late Devonian. Late faulting is indicated by silicified zones.

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GEOMORPHIC HISTORY OF THE CARLSBAD CAVERNS AREA, NEW MEXICO. Leland Horberg. **Jour. Geology,** Vol. 57, No. 5 (Sept. 1949), pp. 464-476. Progressively lowered base levels during the Pliocene and Pleistocene are indicated by the upland surface of the Guadalupe Range and three younger erosion terraces in the Pecos lowland.

INTERPRETATIONS OF FOOTHILLS STRUCTURES, ALBERTA, CANADA. Theodore A. Link. **Am. Assoc. Petroleum Geologists Bull.,** Vol. 33, No. 9 (Sept. 1949), pp. 1475-1501. Structural cross sections made on the basis of geophysical exploration, plus information gathered from subsurface drilling and surface geology, lead to an interpretation of the nature of the structural conditions above and beneath major sole faults. The difficulties of the interpretations are discussed with regard to a hypothetical structure made in the laboratory.

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SHORE PLATFORMS. E. Sherborn Hills. **Geological Magazine,** Vol. 86, No. 3 (May-June 1949), pp. 137-152. The writer proposes that the terms "normal" and "abnormal", in relation to shore platforms should be discarded. Processes operative in the formation of shore platforms are analysed, and the effects of water-layer weathering, growth of marine organism, breakers, and waves of translation on sheltered and open coasts and on various rocks are discussed.

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TOPOGRAPHY AND SEDIMENTS OF THE ARCTIC BASIN. K. O. Emery. **Jour. Geology,** Vol. 57, No. 5 (Sept. 1949), pp. 512-521. Contours of the Arctic Basin and general inferences regarding the bottom topography are given. The basin floor is thought to be far more irregular than has been indicated by present soundings. The deepest part of the basin lies off Alaska and Canada.

Petroleum Geology

ACTIVE - SURFACE CATALYSTS IN FORMATION OF PETROLEUM — II. Benjamin T. Brooks. **Am. Assoc. Petroleum Geologists Bull.,** Vol. 33, No. 9 (Sept. 1949) pp. 1600-1612. The results shown disclose that there is a general tendency to progressively change in composition in age and depth, the older and deeper oils having a larger percentage of light constituents and less heavy residue, although many irregularities are evident.

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BRAZILIAN OIL FIELDS AND OIL-SHALE RESERVES. S. Frôes Abreu. **Am. Assoc. Pettroleum Geologists Bull.,** Vol. 33, No. 9 (Sept. 1949) pp. 1590-1599. The Amazon Valley is the largest area of oil possibilities. Only the Irati and Paraiba Valley shales may be considered in a program for synthetic fuels. Proved reserves of petroleum and natural gas are small.

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GEOLOGY AND PETROLEUM EXPLORATION IN MAGALLANES PROVINCE, CHILE. C. R. Thomas. **Am. Assoc. Petroleum Geologists Bull.,** Vol. 33, No. 9 (Sept. 1949), pp. 1553-1578. Jurassic (?), Upper Cretaceous, and Tertiary marine sediments are covered by an unmeasured series of non-marine Tertiary deposits. Fluvio-glacial deposits blanket much of the area. The structure of the area is described. The possibilities of finding additional commercial oil appear good in view of the thickness of the marine sediments and the existent oil field and indications of another.

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MANANTIALES FIELD, MAGALLANES PROVINCE, CHILE. C. R. Thomas. **Am. Assoc. Petroleum Geologists Bull.,** Vol. 33, No. 9 (Sept. 1949), pp. 1579-1589. The discovery well, which found oil in 1945, is located on a seismic high. The structure is fairly large. The Serie Tobifera, Springhill formation, and Upper Cretaceous and Tertiary rocks are present in this area.

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Petrology

RIPPLE MARKS AS AN AID IN DETERMINING DEPOSITIONAL ENVIRONMENT AND ROCK SEQUENCE. O. F. Evans. **Jour. Sed. Petrology,** Vol. 19, No. 2 (Aug. 1949), pp. 82-86. Differences that help to distinguish between wave-formed and current-formed ripples, and the use of ripple marks in determining rock layer sequence are given.

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SORTING OF SEDIMENTS IN THE LIGHT OF FLUID MECHANICS. Douglas L. Inman. **Jour. Sed. Petrology,** Vol. 19, No. 2 (Aug. 1949), pp. 51-70. The physical relationships existing between the sorting, skewness, and median diameters of sediment samples are observed.

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Stratigraphy

THE BASE OF THE CAMBRIAN IN THE SOUTHERN APPALACHIANS. Part II. Philip B. King. **Am. Jour. Sci.,** Vol. 247, No. 2 (Sept. 1949), pp. 622-645. The general relations and interpretations by Keith and by the writer of the Ocoee series are given. It is proposed that the Ocoee series underlies the Chilhowee group, and is entirely older than it, no part of either being equivalent to any part of the other. The geologic history of the Cambrian and pre-Cambrian is formulated from a survey of the stratigraphy, and conclusions are given.

Ore Deposits Can Now Be Accurately Predicted

GOLDEN, Colo., Oct. 2 (Science Service) — A method of predicting accurately what mineral riches can be mined from the earth, both here and abroad, even before ore deposits are explored or discovered has been developed by S. G. Lasky, chief of the mineral resources section of the U. S. Geological Survey, Washington.

The new technique, revealed at the 75th anniversary celebration of the Colorado School of Mines here, promises to be useful in the "cold war" as a means of telling what metals and other minerals foreign nations can produce.

Already successfully tested on such diverse deposits as gold, copper, silver, nickel, vanadium, and manganese ores, the Lasky method uses a consistent mathematical relationship between the grade of the ore and the tonnage mined.

"Mining geologists have long appreciated that in many deposits there is a gradation from relatively rich to relatively lean material," Mr. Lasky said. "Tonnage increases as grade decreases." Mr. Lasky discovered a consistent relationship between tonnage and grade according to the classical equation of analytical geometry: x equals a plus b times log y, while a and b are constants that vary with the kinds of deposits.

What we can get out of the earth can now be predicted even before the deposits are fully known. The new formula has been fruitfully applied to manganese deposits in Arizona, vanadium and phosphate deposits in Idaho and Wyoming, gold in Alaska, and to nickel deposits.

"Iron curtains" can be penetrated and U. S. experts have more hope of determining just how much manganese is likely to be mined in Russia, India or South Africa, how much platinum in Russia and Canada, tin in Malaya and Bolivia, etc.

The new resources studies by this and other methods can help us to determine where to turn now that Russia has cut off manganese exports, and a Spanish-Italian cartel has increased mercury prices to unprecedented levels.

It will be profitable for us to appraise our mineral wealth, Mr. Lasky warned the mining engineers and geologists. But present knowledge is inadequate as less than a tenth of our country is mapped on a scale satisfactory as a basis for search and appraisal.

Whether the Lasky method of mineral reserves can be applied to uranium is not known, and it was not discussed by Mr. Lasky. Uranium mining has been on a relatively limited scale, production figures are held secret by all nations now, and geologists are unlikely to make any public predictions.

"NITRO" USED TO STIMULATE U. S. OIL WELL PRODUCTION

Over a million quarts of nitroglycerin are used annually to stimulate the production of thousands of oil wells throughout the country. Although "well-shooting" has been a routine well completion practice since 1865, technical information is lacking. The U. S. Bureau of Mines is inaugurating a long-range research program to develop more effective "well-shooting" practices.

EXPERIMENTAL SHALE-OIL REFINERY GOES INTO OPERATION

Announcing completion of the first continuous shale-oil refinery in this country, James Boyd, Director of the Bureau of Mines, said that the new 200-barrel-a-day experimental unit near Rifle, Colo., has been put "on stream" without difficulty.

A highly flexible, continuous unit, the refinery is designed to produce gasoline, Diesel fuel, heating fuels, and fuel gas from crude shale oils extracted at the Bureau's Oil-Shale Demonstration Plant. It was built under contract with the Refinery Engineering Company of Tulsa, Okla., at a cost of $244,912.

Commercial utilization of the Nation's gigantic oil-shale resources is a three-fold problem involving (1) mining the shale, (2) retorting the shale to produce oil, and (3) refining the crude shale oil into useful products. Operation of this new experimental unit under the Bureau's synthetic fuels research and development program is expected to answer for private industry some of the technical and cost questions of shale-oil refining. The mining problem has been largely solved, for the Bureau's experimental oil shale mine already has achieved low-cost production. Work on the retorting problem is well advanced, with research now concentrated on a pilot plant retort designed for continuous operation.

As designed and built, the new experimental refinery is of the minimum size that will provide the desired information about shale-oil refining, including the operating characteristics and costs.

Major pieces of equipment include a furnace or heater, two coking chambers, a combination flash vaporizer and fractionator, stripper for the Diesel fuel fraction, stabilized for the naptha fraction, absorber, and a rerun column for acid-treated gasoline. With only minor changes, the same equipment can be used for atmospheric distillation, delayed coking, single coil recycle cracking, or reforming. Facilities also are available for chemical treating of distillates.

In both function and design, the fractionation section is conventional. Heavy fuel residuum is withdrawn from the flash vaporizer at the base of the fractionating tower. Gas oil and Diesel fuel are taken off as sidestreams from the fractionator, and the Diesel fuel is stripped of its light components before being stored. The gasoline fraction is taken overhead as a vapor and condensed. Uncondensed gases go to the absorber where the condensible hydrocarbons are recovered and returned to the fractionator. Condensed gasoline is pumped to the stabilizer for removal of excessive quantities of butanes and lighter hydrocarbons, and the stabilized gasoline then is sent to the chemical treating unit.

In the treating unit, the distillate first receive a dilute caustic wash for the removal of hydrogen sulfide, light mercaptans, and tar acids. This is followed by a dilute sulfuric acid wash for the removal of nitrogenous compounds, commonly called tar bases. Thus freed of its chemically active compounds, the distillate then is subjected to three stages of counter current extraction with concentrated sulfuric acid for

sulfur removal, improvement of color, and oxidation stability. Next it is washed with water and neutralized with a final dilute caustic treatment. Following chemical treatment, the distillate is redistilled to remove the polymers formed in acid treating, and the specification end point distillate is returned to the treating plant for "doctor" sweetening.

Geologic Map Inventory Nearly Complete

WASHINGTON, Sept. 28 — A graphic picture of the location and extent of geologically mapped areas in the United States will be provided for the first time by an inventory now under way by the Geological Survey.

The mapping inventory, which is nearly complete, is being prepared and published as a series of state maps. Mapped areas are differentiated as to approximate scale; source of publication is given in an explanatory key.

The value of basic geologic data in the solution of many engineering problems has become increasingly apparent in recent years. Civil engineers have found geologic data of particular value in investigations of hydrology, foundations, construction materials, and many other problems involved in large construction projects. Now the mapping inventory makes availability of geologic data easily ascertainable.

Details of the inventory are available in a recent article, "Geologic mapping in the United States," by Leona Boardman, which appeared in the July 1949 issue of the *Bulletin of the Geological Society of America*. Separates of the article are not available but the entire July Bulletin may be purchased for one dollar from the Geological Society of America, 419 West 117th Street, New York 27, New York. Accompanying the article is a map of the United States showing areas covered by published geologic maps of different scales. Reprints of this map may be obtained free of charge from the Engineering Geology Branch, U. S. Geological Survey, Denver Federal Center, Denver 14, Colo., until its small supply is exhausted.

Ten state geologic map indexes have now been published by the Geological Survey on a scale of about 12 miles to the inch. Published state indexes, titled "Index to geologic mapping in the United States, State of.....", may be obtained from the Director, Geological Survey, Washington 25, D. C.; maps covering areas west of the Mississippi may be ordered directly from the Geological Survey, Denver Federal Center, Denver 14, Colo. Prices of maps now available are:

Wyoming $0.50; Nebraska $0.35; Colorado $0.70; Montana $0.35; Iowa $0.35; North Dakota $0.40; Kansas $0.30; South Dakota $0.30; Missouri $0.30; Utah $0.25.

Information on geologic mapping in areas for which a state index map has not been published may be obtained from the Director, Geological Survey, Washington 25, D. C. Unpublished state geologic index maps are on open file in the offices of the Geological Survey in Washington, D. C., pending publication.

New Books

All books listed here are deposited in the Library of The Earth Science Institute and may be borrowed by the members. Books marked with an asterisk may be purchased through The Earth Science Publishing Co., Revere, Mass.

*SEISMICITY OF THE EARTH AND ASSOCIATED PHENOMENA.

B. Butenberg and C. F. Richter. 1949. 273 pp., 34 illus.; $10.00. (Princeton University Press, Princeton, N. J.) This volume gives an account of the relative seismicity of various parts of the earth, and a discussion of the geographical and geological character of the earthquake zones and areas, correlated with active volcano alignments, gravity anomalies, oceanic deeps, mountain structures, and other topographic features. 149 pages of tables of data on earthquakes accompany the work. It is an indispensable addition to the geologist's book shelf.

*LOWER CRETACEOUS STRATIGRAPHY IN SOUTHEASTERN ARIZONA.

Alexander Stoyanow. 1949. 169 pp., 27 pls., 2 figs.; 2.50. (Memoir 38, The Geological Society of America, New York). Studies of the Lower Cretaceous sequence and marine fossil assemblages in southeastern Arizona lead to the discussions and interpretations presented in this book. 21 new species of ammonites and 22 new species of lamellibranchs are described.

GEOPHYSICAL ABSTRACTS 137, APRIL-JUNE, 1949.

M. C. Rabbitt, V. L. Skitsky, and S. T. Vesselowsky. 1949. 73 pp.; $0.20. (Bulletin 966-B, U. S. Geological Survey, Washington, D. C.) This serial gives abstracts of the world literature on geophysics, dealing with exploration by gravitational, magnetic, seismic, electrical, radioactive, geothermal, and geochemical methods and with underlying geophysical theory, research, and related subjects.

GEOLOGY AND GROUND-WATER RESOURCES OF A PART OF SOUTH-CENTRAL KANSAS.

Charles C. Williams and Stanley W. Lohman. 1949. 455 pp., 34 pls., 31 figs.; $0.25. (Bulletin 79, State Geological Survey of Kansas, Lawrence, Kansas). Special reference is given to the Wichita municipal water supply. This region includes the principal area of outcrop of the important Pleistocene water-bearing McPherson formation. The rock outcrops are sedimentary and range in age from Permian to Recent.

CHROMITE DEPOSITS NEAR SEIAD AND McGUFFY CREEKS, SISKIYOU COUNTY, CALIF.

F. C. Wells, C. T. Smith, G. H. Rynearson, and J. S. Livermore. 1949. 48 pp., 27 pls., 5 figs.; $1.25. (Bulletin 948-B, U. S. Geological Survey, Washington, D. C.) The ore bodies are typically chromite-rich schlieren. The reserves total 274,500 tons, with an average of 8% chromium oxide.

LIST OF PUBLICATIONS (Ontario Dept. of Mines).

5th Edition. 1949. 56 pp., 2 figs.; free. (Bulletin No. 25, Ontario Dept. of Mines, Toronto, Ont.). This list includes all the publications for the years 1891 to 1949 inclusive. The section in which the principal reports are arranged chronologically has been extended to include industrial minerals, fuels, and Pleistocene deposits.

MANGANESE RESOURCES OF THE ARTILLERY MOUNTAINS REGION, MOHAVE COUNTY, ARIZONA.

S. G. Laski and B. N. Webber. 1949. 86 pp., 28 pls., 4 figs.; $1.50. (Bulletin 961, U. S. Geological Survey, Washington, D. C.) These deposits contain upwards of 200 million tons of low grade manganese ore. The deposits are a syngenetic alluvial-fan and playa deposit in Pliocene (?) valley fill, which were deposited in an Eocene (?) clased fault basin.

NATURAL GAS IN 1947, PETROLEUM IN 1947,

by R. B. Harkness. 1949. 96 pp.; free. (Annual Report, Vol. LVII, Part III, 1948, Ontario Dept. of Mines, Toronto). The main part of this report is concerned with the description of the logs of 375 gas and oil wells completed during 1947.

Buried Stone Age Dwelling Sites Are Uncovered In Arctic Alaska

VINCENZO PETRULLO
Science Service Correspondent

NEW YORK, Sept. 7 — Discovery of two buried dwelling places of mysterious stone age men who lived in arctic Alaska long before the earliest Eskimos, probably 10,000 years ago, has opened a new frontier of American prehistory.

Working independently, Dr. Louis Giddings of the University of Pennsylvania found an old campsite on Seward Peninsula and Dr. Helge Larsen of Copenhagen's Danish Museum found a cave 35 miles from Deering, both of which had flint implements mingled with caribou bones, showing a new kind of neolithic culture similar to that of stone age men of Asia and Europe.

Their papers are the most sensational of the Twenty-ninth International Congress of Americanists here.

Since the discovery were made only a few weeks ago, the finds are not yet positively dated, but they are certainly long before the Christion era and they are proof that stone age men, following the receding glaciers of the Ice Age, lived in what is now Alaska.

The buried evidences of Alaska's stone age men were found in layers of the earth below those of the earliest known Ipiutak Eskimos who hunted whales and used some iron tools bartered from Siberia. Below the Eskimo culture layer there was found a layer of undisturbed clay that accumulated when human beings were not there. Below were the signs of the stone age people, who used a special kind of small flint scraper implements, called microliths, that were made by knocking a long flake off a core of the stone.

No human skeletons were found, and anthropologists and archaeologists will be searching Alaska next spring when the country opens up for possible burials of this ancient people, as well as additional sites.

The best judgement now is that the stone age Alaskans are not the ancestors of the modern Indians or the Folsom men who are known so far only by their special weapon point found in archaeological excavations in western United States. But they are considered to be of upper paleolithic and perhaps even middle paleolithic age which makes them the most ancient Americans so far found.

Mount Antero Proclaimed A Mineral Park

Mount Antero, noted peak in the Sawatch Range of central Colorado, was proclaimed a Mineral Park by the Colorado Mineral Society at colorful ceremonies held on Colorado Day, August 1, 1949.

A bronze tablet was set in a granite pinnacle just below the summit and not far from the site of the highest mine in the United States. This mine, and in fact the entire 14,245-foot mountain, has been a prolific producer of beautiful gem aquamarine and other rare minerals, which comes from pockets in the pegmatites.

Although world famous since the 1880's as the highest mineral locality in North America, Mount Antero is still regarded as unique among American mineralized areas for its inaccessibility. Equipment for mining in the hard rock must be packed in along a trial that rises over 5,000 feet in seven miles. The Colorado Mineral Society maintained a field camp there during the summer of 1938.

Outstanding among the minerals that come from Mount Antero are unusual ones such as phenakite and bertrandite, and remarkably fine crystals of commoner minerals including smoky quartz, rock crystal, fluorite, and feldspar. One of the largest spheres of rock crystal in existence was cut from Mount Antero quartz and displayed at the Chicago World's Fair in 1893; it is now in the Chicago Museum of Natural History.

Led by James Hurlbut, nine members of the Colorado Mineral Society climbed to the top of the peak over the holiday week-end. After the plaque was mounted, a proclamation prepared by a committee headed by Chester R. Howard was read and pictures were taken. When Mr. Howard was president of the society he proposed this idea in recognition of Mount Antero's significance to mineral collectors. Other members of the committee appointed by Pres. Richard M. Pearl were Minor F. Wasson and Alice Gathercole.

Donald Brown

The last spike is driven into the bronze plaque just below the summit of Mount Antero, proclaiming it a Mineral Park.

WARD'S ISSUES NEW EARTH SCIENCE CATALOG

A new 24-page catalog, "Minerals, Rocks, and Soils", (Catalogue No. 494) has just been issued by Ward's Natural Science Establishment, 3000 Ridge Road East, Rochester 9, New York. This catalog lists pound material, specimens for student and laboratory use, and a number of choice individual specimens. It is available upon request.

THE EARTH SCIENCE INSTITUTE

BULLETIN

Vol. I – No. 2 October, 1949

THE EARTH SCIENCE INSTITUTE BULLETIN *is published occasionally by the Earth Science Institute for its members. All communications should be addressed to Jerome M. Eisenberg, Executive Secretary, The Earth Science Institute, Revere, Mass.*

THE GENERAL MEETING OF SEPTEMBER 30, 1949

The first general meeting of the Earth Science Institute was held at Boston University, 725 Commonwealth Avenue, Boston, Mass., on Friday, September 30, 1949.

The proposed Constitution was corrected and unanimously ratified. The officers elected at the organizing meeting were voted to serve in office until the Annual Meeting. Miss Mary E. Mrose was elected to serve as Treasurer of the Institute.

The following Staff was appointed to serve until the Annual Meeting: Jerome M. Eisenberg, *Director;* C. W. Wolfe, Robert Lund.

It was voted that a photograph contest be conducted by the Institute among students of undergraduate college level or younger. This contest will be conducted by the Staff.

It was voted that a Conference on the Teaching of the Earth Sciences in the Secondary Schools be sponsored by the Institute on Friday and Saturday, March 17 and 18, 1950. Dr. Wolfe was elected Chairman of the Conference.

The Annual Meeting of the Institute was voted to be held on Friday, March 17, 1949. It was voted that the Earth Science Digest, in which is contained the Earth Science Institute Bulletin, be the official publication of the Institute until the Annual Meeting.

The Executive Secretary was instructed to contact the Executive Director of the American Geological Institute on the possibility of joining that organization as an affiliated society.

CONFERENCE ON THE TEACHING OF EARTH SCIENCES IN THE SECONDARY SCHOOLS

The Conference on the Teaching of the Earth Sciences in the Secondary Schools will be held in Boston on Friday and Saturday, March 17 and 18, 1950. It will be open to all interested persons. The

tentative program will be announced in the next Institute Bulletin. The following subjects have been suggested: Outlines for courses of study both as a separate course and as a part of the general science course; illustrative materials, visual aids, and their sources; textbooks on the secondary school level; laboratory equipment; field Suggestions as to the program and to the content of the Conference should be addressed to the Chairman of the Conference, Dr. C. W. Wolfe, Geology Dept., Boston University, 725 Commonwealth Ave., Boston 15, Mass.

THE INSTITUTE LIBRARY

The following publications were presented to the Earth Science Institute with the compliments of the Division of Geology and Geography, National Research Council, Washington, D. C.:

REPORT OF THE COMMITTEE ON THE MEASUREMENT OF GEOLOGIC TIME (1935, 1936, 1937-1938, 1938-1939, 1940-1941, 1941-1942, 1942-1943, 1943-1944-1945-1946; Alfred C. Lane, Chairman. 1946-1947, 1947-1948; John Putnam Marble, Chairman.).

REPORT OF THE COMMITTEE ON PALEOECOLOGY (1935-1936, 1936-1937; W. H. Twenhofel, Chairman).

REPORT OF THE SUBCOMMITTEE ON THE ECOLOGY OF MARINE ORGANISMS (1941, H. S. Ladd, Chairman).

REPORT OF THE COMMITTEE ON MARINE ECOLOGY AS RELATED TO PALEONTOLOGY (1941-1942, 1942-1943, 1943-1944, 1944-1945, 1945-1946; H. S. Ladd, Chairman).

REPORT OF THE COMMITTEE ON A TREATISE ON MARINE ECOLOGY AND PALEOECOLOGY (1946-1947, 1947-1948, H. S. Ladd, Chairman).

REPORT OF THE COMMITTEE ON SEDIMENTATION (1935-1936, 1937-1938; Parker D. Trask, Chairman).

The following books have been loaned to the Institute by the Executive Secretary. 108 books were listed in the first issue of the Institute Bulletin (Earth Science Digest, August 1949).

Bruhns, W., and Ramdohr, P.—PETROGRAPHIE (1949).

Chamberlin, T. C., and MacClintock, P. COLLEGE TEXTBOOK OF GEOLOGY;
Part I, Geological Processes and Their Results (2nd Ed., 1933);
Part II, Historical Geology (2nd Ed., 1930).

Davis, W. M.—PHYSICAL GEOGRAPHY (1900).

Emmons, W. H., Thiel, G. A., Stauffer, C. R., and Allison, I. S.—GEOLOGY, PRINCIPLES AND PROCESSES (1949).

Gutenberg, B. and Richter, C. F. — SEISMICITY OF THE EARTH (1949).

Jeffreys, H.—THE FUTURE OF THE EARTH (1929).

Judd, J. W.—VOLCANOES: WHAT THEY ARE AND WHAT THEY TEACH (1885).

Mansfield, G. R.—POTASH IN THE GREENSANDS OF NEW JERSEY (1922).

Merrill, G. P.—THE NON-METALLIC MINERALS (1904).

North, F. J., Davidson, C. F. and Swinton, W. E.—GEOLOGY IN THE MUSEUM (1941).

Pettijohn, F. J.—SEDIMENTARY ROCKS (1949).

Stoyanow, A. — LOWER CRETACEOUS STRATIGRAPHY IN SOUTHEASTERN ARIZONA (1949).

Twenhofel, W. H., and Shrock, R. R. — INVERTEBRATE PALEONTOLOGY (1935).

Wilfarth, M.—DIE LEBENSWEISE DER DINOSAURIER (1949).

The following periodicals may be borrowed by the members of the Institute through the courtesy of the Earth Science Digest. Requests should be sent to the Institute Library, **not** to the Earth Science Digest. A large number of minor publications relating to the earth

sciences, not listed here for lack of space, are also available to the members.

ACHAT, Vol. 1, Nos. 1-2 (March 1948), to date. Monthly, bi-monthly.

BOLETIM DA SOCIEDADE GEOLOGICA DE PORTUGAL, Vol. 7, No. 3 (1948), to date. Occasional.

BULLETIN INTERNACIONAL DE L'ACADEMIE POLONAISE DES SCIENCES ET DES LETTRES, January 1947, to date. Occasional.

BULLETIN OF THE GEOLOGICAL SOCIETY OF AMERICA, Vol. 60, No. 1. (January 1949), to date. Monthly.

BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA, Vol. 39, No. 1. (January 1949), to date. Quarterly.

CALIFORNIA JOURNAL OF MINES AND GEOLOGY, Vol. 44, No. 3 (July 1948), to date. Quarterly.

GEOLOGIA E METALURGIA, Bulletin No. 6 (October 1948), to date. Occasional.

LLOYDIA, Vol. 2, No. 1 (March 1939), to date. Quarterly.

MINERAL NOTES AND NEWS, Bulletin No. 123 (December 1947), to date. Monthly.

MITTEILUNGEN AUS DEM GEOLOGISCHEN STAATSINSTITUT IN HAMBURG, Vol. 18 (1949), to date. Annual.

NUCLEAR SCIENCE ABSTRACTS, Vol. 1, No. 1 (July 15, 1948), to date. Semi-monthly.

OI. G. G. REVISTA DO INSTITUTO GEOGRAFICO E GEOLOGICO, Vol. 1, No. 1. (July-September 1943) to Vol. 4, No. 3 (July-September 1946); publication suspended. Quarterly.

PROCEEDINGS OF THE UNITED STATES NATIONAL MUSEUM, Vol. 99 (1949), to date. Occasional.

ROCKS AND MINERALS, Vol. 13," No. 6 (June 1938), to date. Some earlier numbers. Monthly (up to August 1948), bi-monthly.

SCIENCE NEWS LETTER, Vol. 53, No. 25 (June 19, 1948), to date. Weekly.

THE AMERICAN MINERALOGIST, Vol. 31, Nos. 1-2 (January-February 1946), to date. Bi-monthly.

THE GEMMOLOGIST, Vol. 18, No. 213 (April 1949), to date. Monthly.

THE MICROPALEONTOLOGIST, Vol. 3, No. 1 (January 1949), to date. Quarterly.

THE MINERALOGICAL MAGAZINE, Vol. 26, No. 172 (March 1941), to date. Quarterly.

THE MINERALOGIST, Vol. 7, No. 9 (September 1939), to date. Monthly.

The Constitution

The following is the Constitution of the Earth Science Institute as ratified by the members present at the General Meeting on September 30, 1949:

Article I: NAME

Sec. 1: The name of this organization shall be: "The Earth Science Institute".

Article II: PURPOSES

Sec. 1: The Earth Science Institute is to be a non-profit organization created exclusively for education in and promotion of the earth sciences.

Sec. 2: The purposes shall be: To disseminate a knowledge and appreciation of the earth sciences, especially in the United States.

Sec. 3: Toward this end the Institute specifically proposes to take steps to achieve the following:

A. The collection, preservation, publication, and exchange of findings and data;

B. The sponsorship of organizations, field work, and meetings;

C. The collection, identification, preservation, exhibition, and exchange of specimens;

D. Acquainting the public with the earth sciences.

E. The increase of educational opportunities in geology.

Article III: MEMBERSHIP

Sec. 1: Membership in this Institute shall be open to organizations and to individuals which/who shall indicate their interest in furthering the objects

of the Institute and who shall comply with the requirements.

Sec. 2: Any organization desiring admission to the Institute shall apply in writing to the Executive Secretary, giving its name, the name and address of its President and Secretary and number of members. Membership fees shall accompany the application.

Applications for individual membership, giving name and address shall likewise be submitted to the Executive Secretary.

Sec. 3: Any individual or organization wishing to withdraw from the Institute shall make such intention known in a written notice to the Executive Secretary. Acknowledgement of the receipt of such notice shall be sufficient to terminate the association. Members three months in arrears shall be automatically dropped.

Sec. 4: Should the attitude or conduct of any individual member or affiliated organization at any time be such as to be considered detrimental to the welfare of the Institute, such member may be expelled if the expulsion has been voted by a two-third's vote of the Executive Board.

Article IV: DUES AND FEES

Sec. 1: Annual dues shall be as folows: Regular membership, $5; Associate membership (non-voting), $3; Supporting membership, $10; Organizational membership, $10. Life membership shall be $100; No further dues shall be required for Life members.

Artitcle V: MEETINGS

Sec. 1: There hall be at least one meeting of this Institute annually, for the transaction of business and the election of officers. This meeting shall be held at a time and place to be designated by the Executive Board. Each individual voting member present shall have one vote. Each affiliated organization shall have one vote.

Article VI: OFFICERS

Sec. 1: The officers of this Institute, who shall be elected for a period of one year, shall consist of: President, 1st Vice-President, 2nd Vice-President, Executive Secretary, Treasurer and five Councilors. They shall take office at the adjournment of the annual meeting at which they are elected, and may not be elected for more than two consecutive terms to their respective offices except that there shall be no time limit to the term of office of the Executive Secretary and of the Treasurer. Upon the end of term of office of the President, he shall automatically be elected to the office of Councilor.

Sec. 2: The Nominating Committee shall be composed of at least three members appointed by the chair. It shall submit a list of candidates, to which list other nominations may be added. This slate shall be considered by the Executive Board and if the candidates are approved, placed in nomination. This slate shall be voted on at the annual meeting, as provided above. Voting may be by mailed ballot or by ballot at the annual meeting.

Article VII: THE EXECUTIVE BOARD

Sec. 1: The officers of this Institute shall constitute the Executive Board which shall transact such business as shall be deemed necessary. The Executive Board shall establish its own by-laws to govern its procedure.

Article VIII: STAFF

Sec. 1: The Executive Board shall appoint a Staff at the annual meeting to conduct the business and editorial matters of the Institute.

Sec. 2: The Staff shall consist of a Director and such assistants as shall be deemed necessary by the Executive Board. The compensation of the Staff, if any, shall be fixed by the Executive Board.

Article IX: COMMITTEES

Sec. 1: The Executive Board may appoint the following standing committees: a Committee on Publications; a Committee on Projects; a Committee on Finance; a Committee on Geologic Education; a Committee on Membership. The Nominating Committee shall be appointed by the Chair.

Article X: PROCEDURE

Sec. 1: Robert's **Rules of Order** shall govern the procedure in all general meetings except as specifically provided for above.

Article XI: RATIFICATION AND AMENDMENT

Sec. 1: This Constitution shall be considered to be in effect when it has been approved by the organizing committee and shall be considered ratified when so voted by a majority at the first general meeting.

Sec. 2: Amendments to this Constitution shall be considered adopted when they have been passed by a two-thirds vote of the Executive Board and approved by a majority vote in an annual meeting.

Old Piltdown Man Is Only About 10,000 Years Old

J. G. FEINBERG
Science Service Correspondent

NEWCASTLE-UPON-TYNE, England, Sept. 7 — Famous Piltdown man, long considered one of mankind's oldest ancestors, is a mere anthropological infant, not more than 10,000 years old. Dr. K. P. Oakley of the British Museum disclosed to the British Association for the Advancement of Science here.

Previously considered to be between 100,000 and 500,000 years old, the jawbone and skull are now proved by analysis of their fluorine content to be definitely of the last interglacial period.

Fossil animal bones of known geological age, dating from the Pleistocene period, unearthed nearby the human bones at Piltdown, England, had the same content of the chemical fluorine picked up from the groundwater of the locality.

Dr. Oakley exploded the attractive idea of modern man being descended from the Piltdown man, also known as Eoanthropus, the Dawn Man. A long controversy over whether the skull and the jawbone were from the same individual seems to have been sttled also, as they both have the same fluorine content. Some experts held that the skull was that of a relatively recent man and the jawbone of an ancient anthropoid.

England still claims an ancient human ancestor. The Swanscombe skull was give the fluorine test and pronounced Middle Pleistocene, about 60,000 years old, and probably Britain's earliest man.

The BOOK SHELF

All books listed here may be obtained by sending a check or money order to THE BOOK SHELF, THE EARTH SCIENCE DIGEST, REVERE, MASS. We pay postage.

A CATALOG OF BOOKS ON THE EARTH SCIENCES

Part V — Historical Geology

A HISTORY OF LAND MAMMALS IN THE WESTERN HEMISPHERE by William B. Scott. 2nd Edition. 1937. 786 pp., illus. ..... $ 9.00

AN INTRODUCTION TO HISTORICAL GEOLOGY by W. J. Miller. 5th Edition. 1942. 499 pp., illus. 4.00

AN INTRODUCTION TO THE STUDY OF FOSSIL PLANTS by John Walton. 1940. 188 pp., illus. 3.75

AN INTRODUCTION TO THE STUDY OF FOSSILS by Hervey W. Shimer. 2nd Edition, 1933. 496 pp., illus. 5.25

BEFORE THE DAWN OF HISTORY by Charles R. Knight. 1935. 119 pp., illus. 2.75

DIE LEBENSWEISE DER DINOSAURIER by M. Wilforth. In German. 1949. 95 pp., 68 illus. 3.60

ELEMENTS OF GEOLOGY, PART I. HISTORICAL by W. J. Miller. 2nd Edition. 1939 ..... 2.35

EVOLUTION by A. Franklin Shull. 1936. 312 pp., 64 illus. 3.25

FORAMINIFERA: THEIR CLASSIFICATION AND ECONOMIC USE by Joseph A. Cushman. 4th Edition. 1949. 605 pp. 86 pls., 9 fig. 10.00

HISTORICAL GEOLOGY by Carl O. Dunbar. 1949. 567 pp., 380 illus. 5.00

HISTORICAL GEOLOGY (Part II of An Introduction to Geology) by William B. Scott. 3rd Edition. 1932. 485 pp., illus. 4.50

HISTORICAL GEOLOGY OF THE ANTILLEAN-CARIBBEAN REGION (Vol. I of Historical Geology of North America) by Charles Schuchert. 1935. 811 pp., illus. 12.00

INDEX FOSSILS OF NORTH AMERICA by Hervey W. Shimer and Robert R. Shrock. 1944. 837 pp., 303 pls. 20.00

INTRODUCTION TO HISTORICAL GEOLOGY by Raymond C. Moore. 1949. 582 pp., 386 illus. 5.00

ORGANIC EVOLUTION by Richard S. Lull. 1947. Revised Edition. 744 pp., illus. 8.00

OUTLINES OF HISTORICAL GEOLOGY by Charles Schuchert and Carl O. Dunbar. 4th Edition. 1941. 291 pp., 176 illus. 3.00

PALEONTOLOGY - INVERTEBRATE by Henry Woods. 8th Edition. 1946. 477 pp., illus. 3.00

PREHISTORIC LIFE by Percy E. Raymond. 1939. 324 pp. 156 illus. 5.00

The Rocks and Minerals Association

Headquarters: Peekskill, N. Y., U.S.A. Organized in 1928 for the increase and dissemination of mineralogic knowledge. Membership in the Association is open to all persons of good standing in their respective communities, and who are possessed of a sincere interest in matters mineralogic.

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SELECTED MINERAL SPECIMENS

It is our pleasure this month to list a number of minerals that can be purchased for a nominal sum.

ACTINOLITE—Vermont. Dark green xls in light colored talc. 2″ 25¢; 3″ 50¢.

AGATE NODULES—Oregon. Polished halves of "Thunder-eggs" 2″ $1.00; 3″ $2.00.

AMETHYST—Montana. Xls attached to quartz in parallel growth 1½″ 35¢; 2″ 75¢; 3″ $1.50.

BAUXITE—Arkansas. Dark red pisolitic bauxite. 2″ 35¢; 3″ 50¢.

CANCRINITE—Ontario. Yellow cancrinite with blue sodalite. 2″ 50¢; 2″x3″ 75¢; 3″ $1.00.

CHALCEDONY—Florida. Blue pseudomorphs after coral. 2″ 30¢; 3″ 75¢.

CHRYSOCOLLA—Arizona. Massive blue chrysocolla with some quartz 2″ 75¢; 3″ $1.50.

COLEMANITE—California. Small xls on matrix. Slightly phosphorescent. 2″ 75¢; 2″x3″ $1.00; 3″ $1.50.

CRESTMOREITE—California. Crystalline with blue calcite 2″ 30¢; 3″ 60¢..

CRYOLITE—Greenland. Massive white. Some with siderite 2″ 50¢; 3″ $1.00.

EMERY—Massachusetts. Massive black 2″ 25¢; 3″ 40¢.

GARNET—Arizona. Groups of olive-green crystals. 1½″ 75¢; 2″ $1.25; 3″ $2.00.

GALENA—Missouri Choice crystal groups. 1½ 50¢ 2″ $1.00; 2½″ $1.50.

HEXAGONITE—New York. Reddish-lavender xline masses. 2″ 35¢; 3″ 50¢.

HEULANDITE—New Jersey. Pearly-white to cream xls on matrix 1½″ 35¢; 2″ 75¢; 3″ $1.50.

LODESTONE—Arkansas. Magnetite with very strong polarity. 1½″ 35¢; 2″ 50¢; 3″ $1.00.

MARGARITE—Massachusetts. Pink foliated masses in rock. 2″ 50¢; 3″ 75¢.

MIMETITE—Mexico. Pale-green xls on matrix. Choice. 1″ 50¢; 1½″ $1.00; 2″ $1.50.

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